CHAPTER 4

Prenatal care use in Belgium and the Netherlands: predisposing, enabling and pregnancy-related determinants

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Submitted

ABSTRACT

Background: Examining determinants of prenatal care (PNC) trajectories is important to stimulate an equitable distribution of PNC across Europe. This study (1) compares PNC utilization in Belgium and the Netherlands and (2) identifies predisposing, enabling and pregnancy-related determinants.

Methods: Secondary data analysis was performed using pooled and matched data from Belgium, and the Netherlands. The content and timing of care during pregnancy (CTP) tool measured PNC use. Non-parametric tests and ordinal logistic regression were performed.

Results: Dutch women received appropriate PNC more often than Belgian women. Lower education, unemployment, lower continuity of care and non-attendance of antenatal classes were associated with a lower likelihood of having more appropriate PNC.

Conclusions: Women in urban Dutch regions used more appropriate PNC than women in the Brussels Metropolitan Region. However, irrespective of the region (Brussels versus urban-Netherlands) or any enabling characteristic, the content and timing of PNC was associated with predisposing and pregnancy-related variables. Lower health literacy in socially vulnerable women might explain the predisposing determinants. Regarding pregnancy-related determinants, improving continuity of care by creating new maternal healthcare models could enhance PNC use.

Keywords: Prenatal care/utilization, Health behaviour, Socio-economic factors, High-income countries, CTP or content of care

INTRODUCTION

An understanding of the individual determinants of prenatal care (PNC) utilization may assist the pursuit of adequate levels of care recommended for every pregnancy. A minimum level of PNC is important because it enables early and continuing risk assessment, health promotion and medical and psychosocial follow-up.[1] Despite its value, some women do not make proper use of PNC.[2]

According to the Andersen health behavioural model, individual determinants of healthcare utilization can be divided into predisposing, enabling[3] and need components.[4] With respect to PNC, predisposing determinants refer to individual characteristics which exist prior to the pregnancy and affect the propensity to use care. Previous studies have concluded that low maternal age[4-7], being single[7], low educational level[6-9], lack of a paid job[9], foreign ethnic background[6,9], or origin[2,5,8], poor language proficiency[1,7], (little) support from a social network[1] and lack of knowledge of the healthcare system[1] are associated with inadequate PNC utilization. Enabling determinants refer to conditions, which make PNC available to pregnant women. Uninsured status[6,7], planned pattern of PNC[6], hospital type at booking[6], personal treatment, communication and knowledge of cultural practices of the care provider[1] have been found to be associated with inadequate PNC. The need component can be extended to a more specific 'pregnancy-related' element of the determinants. Inadequate use of PNC is related to high parity[5-7], unplanned pregnancy[7], no previous premature birth[6], continuity of care[8], late recognition of pregnancy[6] and behavioural factors such as smoking during pregnancy.[6,9]

The operationalisation of PNC utilization varies across studies, therefore results must be interpreted cautiously. The initiation of care[1,5-7,9], the number of prenatal visits[6,7] and several indices based on the timing of initiation of PNC, the total number of prenatal visits and the gestational age at birth[2,6-8] have been considered. Since there is no consensus about the number of prenatal visits[10], it is preferable to take into account elements of the content and timing of care during the pregnancy. One recent study measured PNC more comprehensively using the content and timing of care during pregnancy (CTP) tool.[8]

Previously defined determinants of PNC use should be interpreted in relation to the context of these studies. In addition to individual determinants, healthcare utilization depends on resources (e.g. number of care providers available) and the organisation of the national healthcare system, such as the nature of referrals between healthcare providers.[3] Feijen-de Jong *et al.* identified the need for comparative research in several countries with varying prenatal healthcare arrangements as these might explain differences in the effects of individual determinants on PNC use.[6] In this study, we compared PNC between cohorts in two different countries (Belgium and the Netherlands). In the Netherlands, most women with uncomplicated pregnancies receive PNC from primary care midwives who act

as gatekeepers to secondary obstetric care.[11] They receive fixed remunerations for follow-up during the full length or part of the pregnancy.[12] In Belgium, most women access an obstetrician directly for PNC as they do not need preauthorisation to gain access to specialist care.[5] The majority of general practitioners, specialists and independent midwives are paid on a fee-for-service basis.[13]

This study aimed to 1) compare PNC utilization in Belgium and the Netherlands as measured by the CTP tool and 2) to identify its predisposing, enabling and pregnancy-related determinants.

METHODS

Data collection

A secondary data analysis was performed using pooled data from two studies. For Belgium, data were obtained from a prospective observational study conducted in the Brussels Metropolitan Region (the CTP study).[10] Recruitment occurred between April and July 2008 in nine out of 12 hospital centres for ultrasound to which every woman is referred. All low risk women, at the beginning of their care trajectory (attending a first or second visit or having a gestational age less than 16 weeks) were legible for inclusion. Data collection comprised a questionnaire about personal characteristics and pregnancy history at the moment of recruitment, a diary recording all prenatal visits in a standardised manner and bimonthly telephone follow-up interviews to record PNC use (n=333).[10] This study was approved by all participating centers and from the Ethic Committee of the University Hospital UZ Brussel.

For the Netherlands, data were obtained from the DELIVER (Dutch acronym for 'data primary care delivery') study. Data were gathered in a 12-month study period in 2009-2010. The Deliver study is a descriptive study that aimed to provide information about midwifery care organization, accessibility of midwifery care, and the quality of primary midwifery care in the Netherlands.[14] Data collection with regard to pregnant women recruited in primary care midwifery practices included up to two questionnaires about socio-demographic characteristics and ultrasound scans. One questionnaire was administered before 34 weeks of gestation and the other between 34 weeks of gestation and birth. In addition, information about prenatal care utilization was gathered by extracting data from electronic client records of participating clients. This study was approved by the Medical Ethics Committee of the VU University Medical Center Amsterdam. More study details can be found in the specific papers.[10,14]

Composition of the pooled data set

To have comparable inclusion criteria for the secondary data analysis, only adult women (> 18 years) residing in an urban region (2500 or more households per km²) with a low-risk onset of pregnancy were eligible for inclusion. Application of these criteria meant a reduction of the Dutch study sample to 632 women (Figure 1). Because of the unbalance in the numbers between both samples, a pooled data set was constructed by combining the entire sample from the Belgian study (n = 333) and a random matched sample from the 632 women remaining in the Dutch study.

To reduce possible pre-exisiting differences in distribution between both populations, predictors for prenatal care use were used to define a comparable dataset. Our first step was to reduce missings in the Dutch data. Multiple imputation was performed for missing values with regard to household income (97/632), using the hot deck method.[15] Seen Chi-square analyses indicated that non-response concerning household income depends on a woman's occupational status and educational level ($p < 0.05$). Missing values of non-respondents were replaced by observed values from a respondent similar to the non-respondent[16] for these variables. Five imputed data sets were generated to calculate the mean household income for each non-respondent. There were no missings in the Belgian study.

After completing the imputation in the Dutch sample we observed that the individual characteristics of both subsamples were distributed differently. Women in the Belgian subsample were significantly ($p < 0.05$) younger (aged ≤ 20), were more often single, more often less educated, less likely to be active on the labour market and were more often of a foreign nationality compared to the Dutch subsample. In the Belgian sample, women had more often a less educated partner ($p < 0.05$) and more often a partner with a foreign nationality. Furthermore, these women more often had a low and high equivalent income ($p < 0.05$) and lack of health insurance and additional health insurance cover. Finally, these women were more often multiparae ($p < 0.05$), had more unwanted pregnancies, more unplanned pregnancies and attended fewer prenatal information classes. These observed differences might potentially influence differences in healthcare utilization, therefore exact matching without replacement[17] was conducted in order to balance the distribution of individual characteristics between the subsamples of the pooled data set. The units of the Dutch subsample were ordered at random and were matched 1:1 to the units of the Belgian subsample for two variables: educational level[6,7,9] and maternal age.[5-7] These variables were chosen because in literature they were observed to be predisposing determinants of PNC use. For 321 women in the Belgian sample we were able to match with someone in the DELIVER study. The final pooled dataset (n=642) therefore consisted of 321 women from Belgium and 321 from the Netherlands.

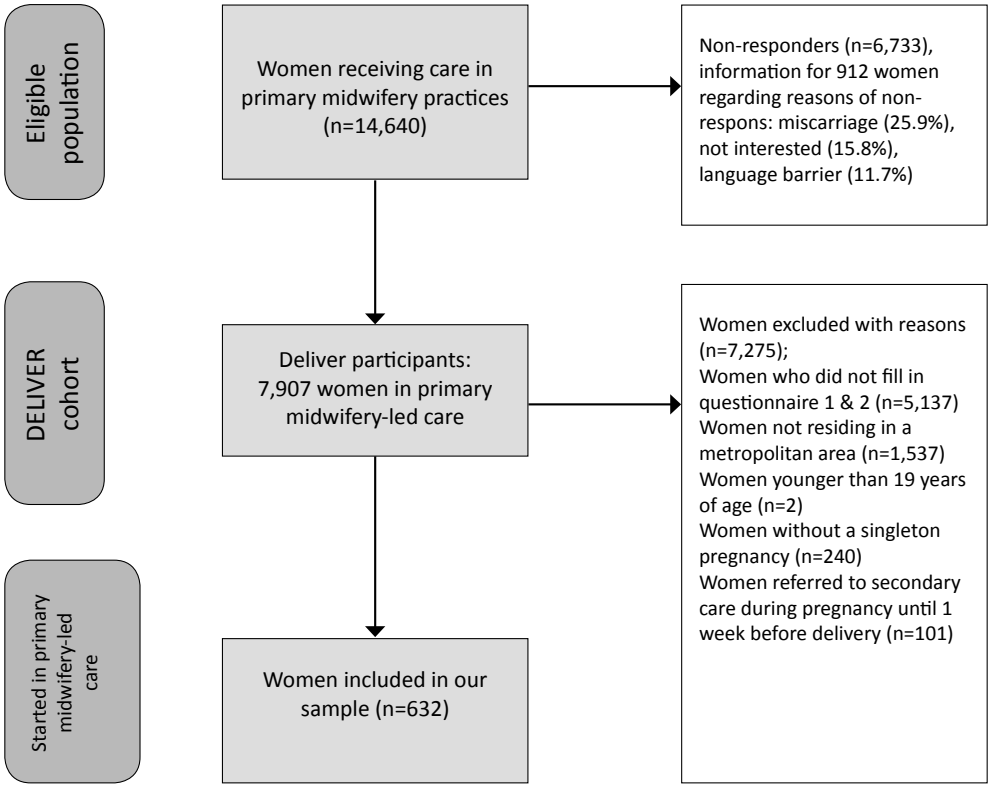
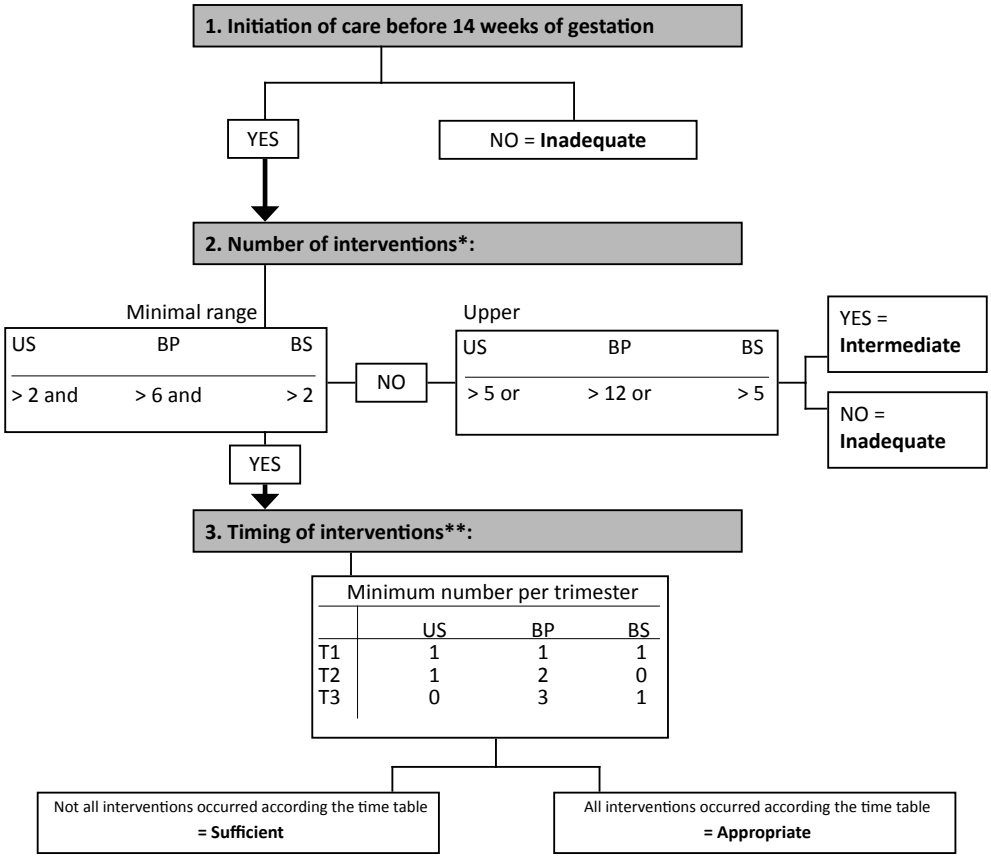


Figure 1. Eligible population, DELIVER cohort and study population

Operationalisation of PNC utilization by the CTP tool

The CTP tool considers three dimensions: the timing of initiation of care, and the number and timing of three specific interventions during pregnancy (blood screening, ultrasound and blood pressure measurement).[10] Four categories of PNC use are defined by the CTP: inadequate, intermediate, sufficient or appropriate care. This classification reflects the degree to which a minimum amount of care recommended for every pregnancy was received, regardless of parity or risk status.[10] As the CTP was developed based on evidence about the importance of interventions in pregnancy and the congruence of PNC guidelines, the tool is applicable in the Netherlands.[18-21]



US: Ultrasound BP: Blood Pressure BS: Blood Screening T: Trimester
*Ranges based on the NICE (NICE, 2008) and Belgian guideline (Lodewyckx K. et al., 2014)
**Ranges based on the NICE guidelines (NICE, 2008)
Inadequate: initiation of care after first trimester OR the number of at least one intervention is less than the lower range and none of the interventions occurred more than the range
Intermediate: initiation of care in the first trimester; the number of at least one intervention occurred less than the lower range and at least one intervention exceeded the range
Sufficient: initiation of care in the first trimester; the number of all interventions equals at least the respective lower range but timing of at least one intervention is not as recommended
Appropriate: initiation of care in the first trimester; the number of the interventions equals at least the respective lower range and timing of the actions of all basic interventions is as recommended

Figure 2. Outline of the Content and Timing of care in Pregnancy (CTP) tool *(*Beeckman *et al.*, 2013)

Potential individual determinants of PNC utilization

The original data collection instruments used in both studies were explored to determine the variables that had been equivalently operationalised. The common variables to form the predisposing component were age, marital status, educational level, occupational status and current nationality. In addition, educational level and current nationality of the partner were examined. A variable for region referred to the two original study samples: the Metropolitan Region of Brussels, Belgium (CTP study) and urban regions in the Netherlands (DELIVER study). The educational level of CTP and DELIVER women was classified into three categories according to the International Standard Classification of Education (ISCED).[22]

The variables reflecting the enabling component were equivalent income, health insurance cover and additional health insurance cover. Equivalent income was calculated by using the modified Organization for Economic Co-operation and Development (OECD) scale and classified into three categories. This scale involves adjusting monthly household income based on its size and the age of its members.[23] The lowest income group was defined at < 60% of the respective median national income[24], the at-risk-of-poverty threshold.[24] The moderate and high-income groups were delineated at 60–120% and > 120% of the national median equivalent net income respectively.

The variables describing the pregnancy-related component were parity, wish for pregnancy, planned pregnancy, continuity of care and attendance of prenatal information classes. Continuity of care was measured by the Continuity of Carer (COC) index, based on the number of visits to each different healthcare provider and the total number of visits.[25] The index, expressed in percentage, was divided into two categories, with the cut off point < 50% and ≥ 50%.

Statistical analysis

For each region, the individual characteristics of the study sample and PNC utilization were summarised. Individual characteristics and PNC utilization were compared between countries using Chi-squared tests, the association between each of the individual characteristics and PNC utilization for the whole sample was determined (Chi-squared tests). Subsequently, logistic ordinal regression analysis was used to examine the significance of each individual characteristic in terms of its likelihood of being given a higher CTP classification, while controlling for the remaining significant characteristics. Since this was an exploratory study, backward elimination was used (stay level: $p < 0.05$). Our model was constructed in three steps in accordance with the health behaviour model.[3,4] The first step considered predisposing variables, the second step considered enabling factors, with the selected predisposing variables fixed in the model, and in the final step the pregnancy-related variables were examined while controlling for the selected predisposing and enabling variables. In order to include other variations between the subsamples, the variable region

was fixed in this model from the first step onwards. A Score test for the proportional odds assumption and absence of multicollinearity was undertaken for each step. In addition, the final model assessed the percentage of concordant pairs of predicted probabilities and observed responses (> 60%). Multivariate analyses were conducted in SAS 9.1, and all other analyses were performed using SPSS Statistics 20.

RESULTS

Characteristics of the women

The final data set consisted of 642 women. Chi-square tests indicated significant differences between the two subsamples for marital status, occupational status, nationality, educational level of the partner, nationality of the partner, equivalent income, health insurance or additional health insurance cover, parity, desire for pregnancy and attendance of prenatal information classes ($p < 0.05$).

The majority of the women in the final data set were aged between 21 and 35 years (82.2%), were co-habiting or married (94.1%), employed (65.3%), did not have tertiary education (58.6%) and did not have a foreign nationality (42.1%) (Table 1). Of the women, 42.1% had a partner with tertiary education and 68.7% had a partner who did not have a foreign nationality. With regard to the enabling characteristics, 70.2% of the women had a moderate equivalent income, 97.0% had health insurance cover and 32.9% had no additional health insurance cover. The pregnancy-related characteristics revealed that 55.8% of the women were multiparae. Pregnancy was wanted for 98.0% of the women but unplanned for 20.2%. A lower continuity of care provider, represented by a COC index < 50%, was observed for 72.1% of the women, while 62.9% did not attend prenatal information classes.

Table 1. Study sample characteristics, chi-squared test reporting significance level for association with antenatal care utilization, ordinal regression analysis reporting adjusted odds ratios (OR) for being assigned into a higher Content and Timing of Pregnancy (CTP) category

		Prenatal care utilization classified by the CTP tool				P value χ^2 test	Adjusted OR
		Inadequate (N = 49)	Intermediate (N = 46)	Sufficient (N = 214)	Appropriate (N = 333)		
	Total (column %)[f]	N (row %)[f]	N (row %)[f]	N (row %)[f]	N (row %)[f]		
Predisposing characteristics							
Age (years)						(a)	(b)
≤ 20	8 (1.2)	0	0	6 (75.0)	2 (25.0)		
21–35	528 (82.2)	41 (7.8)	40 (7.6)	172 (32.6)	275 (52.1)		
> 35	106 (16.5)	8 (7.5)	6 (5.7)	36 (34.0)	56 (52.8)		
Marital status						(a)	(b)
Co-habiting or married	604 (94.1)	44 (7.3)	45 (7.5)	197 (32.6)	318 (52.6)		
Single	38 (5.9)	5 (13.2)	1 (2.6)	17 (44.7)	15 (39.5)		
Occupational status						**< 0.001**	**0.49 (0.34-0.70)**
Employed	419 (65.3)	20 (4.8)	26 (6.2)	120 (28.6)	253 (60.4)		
Unemployed	223 (34.7)	29 (13.0)	20 (9.0)	94 (42.2)	80 (35.9)		
Educational level						**< 0.001**	**0.60 (0.43-0.82)**
Up to secondary	376 (58.6)	35 (9.3)	33 (8.8)	139 (37.0)	169 (44.9)		
Tertiary	266 (41.4)	14 (5.3)	13 (4.9)	75 (28.2)	164 (61.7)		
Nationality						**0.009**	(b)
Belgian/Dutch	475 (74.0)	29 (6.1)	36 (7.6)	149 (31.4)	261 (54.9)		
All other nationalities	167 (26.0)	20 (12.0)	10 (6.0)	65 (38.9)	72 (43.1)		
Educational level partner						**< 0.001**	(b)
No partner	38 (5.9)	5 (13.2)	1 (2.6)	17 (44.7)	15 (39.5)		
Up to secondary	334 (52.0)	33 (9.9)	30 (9.0)	120 (35.9)	151 (45.2)		
Tertiary	270 (42.1)	11 (4.1)	15 (5.6)	77 (28.5)	167 (61.9)		
Nationality of the partner						**0.003**	(b)
No partner	38 (5.9)	5 (13.2)	1 (2.6)	17 (44.7)	15 (39.5)		
Belgian/Dutch	441 (68.7)	27 (6.1)	29 (6.6)	133 (30.2)	252 (57.1)		
All other nationalities	163 (25.4)	17 (10.4)	16 (9.8)	64 (39.3)	66 (40.5)		
Region						**0.009**	0.90 (0.64-1.26)
Brussels Metropolitan Region	321 (50.0)	31 (9.7)	26 (8.1)	118 (36.8)	146 (45.5)		
Urban Dutch regions	321 (50.0)	18 (5.6)	20 (6.2)	96 (29.9)	187 (58.3)		

Enabling characteristics							
Equivalent income[c]						**< 0.001**	(b)
Low	112 (17.4)	17 (15.2)	9 (8.0)	51 (45.5)	35 (31.3)		
Moderate	451 (70.2)	29 (6.4)	33 (7.3)	141 (31.3)	248 (55.0)		
High	79 (12.3)	3 (3.8)	4 (5.1)	22 (27.8)	50 (63.3)		
Health insurance cover						(a)	(b)
Yes	623 (97.0)	46 (7.4)	46 (7.4)	202 (32.4)	329 (52.8)		
No	19 (3.0)	3 (15.8)	0 (0.0)	12 (63.2)	4 (21.1)		
Additional health insurance cover						**< 0.001**	(b)
Yes	431 (67.1)	24 (5.6)	29 (6.7)	130 (30.2)	248 (57.5)		
No	211 (32.9)	25 (11.8)	17 (8.1)	84 (39.8)	85 (40.3)		
Pregnancy-related characteristics							
Parity						**0.042**	(b)
Primiparae	284 (44.2)	19 (6.7)	16 (5.6)	84 (29.6)	165 (58.1)		
Multiparae	358 (55.8)	30 (8.4)	30 (8.4)	130 (36.3)	168 (46.9)		
Wish for pregnancy[d]						(a)	(b)
Wanted pregnancy	628 (98.0)	49 (7.8)	44 (7.0)	210 (33.4)	325 (51.8)		
Unwanted pregnancy	13 (2.0)	0 (0.0)	2 (15.4)	4 (30.8)	7 (53.8)		
Planned pregnancy						**0.013**	(b)
Yes	512 (79.8)	35 (6.8)	34 (6.6)	161 (31.4)	282 (55.1)		
No	130 (20.2)	14 (10.8)	12 (9.2)	53 (40.8)	51 (39.2)		
COC[e]						**0.041**	**0.60 (0.42-0.84)**
< 50%	463 (72.1)	42 (9.1)	39 (7.8)	158 (34.1)	227 (49.0)		
≥ 50%	179 (27.9)	7 (3.9)	10 (5.6)	56 (31.3)	106 (59.2)		
Attending antenatal information classes						**< 0.001**	**0.67 (0.47-0.94)**
Yes	238 (37.1)	11 (4.6)	7 (2.9)	72 (30.3)	148 (62.2)		
No	404 (62.9)	38 (9.4)	39 (9.7)	142 (35.1)	185 (45.8)		

a: The condition for the chi-squared test for larger contingency tables was not met: valid if less than 20% of the expected numbers are under 5 and the minimum expected count is less than 1 (Kirkwood B.R. and Sterne J.A.C., 2003)

b: Not included in the final model of ordinal logistic regression analysis

c: ∑ incomes in the household/(1 + (x*0.5) + (y*0.3)) (x: number of adults living in the same household, y: number of children under the age of 18 years living in the same household [modified OECD scale] (OECD, 2013))

d: n = 641

e: Continuity of Care index: COC = $\frac{\sum_{i=1}^{n} d_i^2 - n}{n(n-1)}$ ((Bice and Boxerman, 1977))

f: Because of rounding, percentages may not add up to 100%

Table 2. Comparison of prenatal care utilization between regions (N=642)

	Total	Brussels Metropolitan Region	Urban Dutch regions	p-value χ^2 test
	(N=642)	(n=321)	(n=321)	
	N (column %)	N (column %)	N (column %)	
Content and Timing of Pregnancy care				
Inadequate	49 (7.6)	31 (9.7)	18 (5.6)	**0.009**
Intermediate	46 (7.2)	26 (8.1)	20 (6.2)	
Sufficient	214 (33.3)	118 (36.8)	96 (29.9)	
Appropriate	333 (51.9)	146 (45.5)	187 (58.3)	

Comparison of PNC utilization between both countries

PNC utilization differed significantly between countries (p = 0.009) (Tables 1-2). According to the classification by the CTP tool, 9.7% of the women from the CTP subsample had an inadequate care trajectory compared with 5.6% in the DELIVER subsample. Furthermore, only 45.5% of the women in Belgium, compared to 58.3% of Dutch women, were assigned to the appropriate PNC group (Table 2).

Individual determinants of PNC utilization

The predisposing characteristics of occupational status (p < 0.001), educational level and nationality of the women (p < 0.001; p = 0.009 respectively) and their partners (p < 0.001; p = 0.003 respectively) were found to be significantly associated with PNC utilization (Table 1). Appropriate PNC use was higher among women with tertiary education (61.7%), who were employed (60.4%) and who were not of a foreign nationality (54.9%) than among women with secondary level education (44.9%), who were unemployed (35.9%) and had a foreign nationality (43.1%) respectively. Concerning the enabling characteristics, results showed that the higher the equivalent income, the higher the proportion of women with appropriate PNC utilization (p < 0.001). More than half of the women with moderate (55.0%) or high equivalent income (63.3%) received appropriate PNC. This proportion was 31.3% among women with low equivalent income. Women with additional health insurance cover received appropriate content and timing of pregnancy care more often than women without this cover (57.5% versus 40.3%) (p < 0.001). With respect to pregnancy-related characteristics, appropriate care use was higher among primiparae (58.1%), women with a planned pregnancy (55.1%), women who had a COC index ≥ 50% (59.2%) and women who attended prenatal information classes (62.2%) compared with multiparae (46.9%), women with an unplanned pregnancy (39.2%), women who had a COC index < 50% and women who did not attend prenatal information classes (45.8%) respectively (p < 0.05).

In the final model of the multivariate analysis, after adjustment for confounding variables (Table 1), the overall regional variable (the CTP versus the DELIVER subsamples) did not

remain significantly associated with PNC use. However, four variables were significantly associated with PNC utilization when controlling for the other variables. Women with no more than a secondary education (OR: 0.60; 95% CI 0.43–0.82) and unemployed women (OR: 0.49; 95% CI 0.34–0.70) had lower odds of being assigned to a higher CTP category compared with women with tertiary education and employment respectively.

In the final model no enabling characteristics remained significantly associated with the content and timing of PNC. With regard to pregnancy-related characteristics women with a COC index < 50% (OR: 0.60; 95% CI 0.42–0.84) and women who did not attend prenatal information classes (OR: 0.67; 95% CI 0.47–0.94) had lower odds of obtaining a higher CTP classification compared with women with a COC index ≥ 50% and those attending prenatal information classes respectively.

DISCUSSION

This study compared PNC utilization as classified by the CTP tool between cohorts in two different countries and identified predisposing, enabling and pregnancy-related determinants based on a pooled data set. To our knowledge this is the first international comparative study that has considered these three factors related to the content and timing of PNC. Unadjusted analysis revealed that women in urban Dutch regions received more appropriate PNC than women in the Brussels Metropolitan Region. However, multivariate analysis did not indicate that the region in itself was a determinant of PNC utilization when controlling for all individual characteristics. Irrespective of the region, the content and timing of PNC was associated with educational level, employment status, continuity of care and attendance of prenatal information classes.

Previous studies have shown that a low educational level is associated with late initiation of PNC[6,7,9], a low number of prenatal visits[6,10], receiving no care at all[6] and a lower probability of being in a higher CTP category.[8] Lack of a paid job[9] and type of occupation[26] have also been related to inadequate PNC use. Choté *et al.* suggested that education might influence PNC use due to the level of general health knowledge and health literacy.[9] The knowledge and skills acquired through education may create better access to information, stimulate receptiveness to health education messages and thus enable to access and communicate with healthcare providers.[27] The social network, which may be less extended in unemployed women might be a mechanism explaining the association of employment with PNC use. Information and encouragement received through a social network may stimulate women to use care.[28,29]

No enabling characteristics, such as income, were retained in our final model. The compulsory universal cover offered by health insurers, which includes basic PNC in both Belgium[13] and the Netherlands[30] may play a part. However, the provision of universal cover

seems to be insufficient to offset disparities in PNC utilization.[26] The use of healthcare services can be measured in terms of realised access to these services.[4] Inequitable access occurs when important structural aspects of society determine who receives appropriate PNC. However, a sole focus on measures designed to alter these aspects – such as educational level and employment status – for the sake of promoting equitable access, is hard due to their low mutability.[4] Other measures, such as the promotion of health literacy and knowledge from an early age through the education system or the training of health professionals in communication skills to adapt to the health literacy level of the care seeker, may encourage better utilization of care.[31]

With regard to pregnancy-related determinants, this study demonstrated that a lower continuity of PNC provider was associated with a lower CTP category. This index was calculated without differentiating between the type of primary caregiver – in Belgium most often an obstetrician and in the Netherlands a midwife. These results indicate that the continuity of care provider is important for the appropriateness of care irrespective of the type of provider. Attending prenatal classes was related to receiving a more appropriate PNC trajectory, although the number and content of these classes were not considered. While non-attenders were not convinced that prenatal classes might benefit them, attenders considered them to be valuable.[32] Similarly, non-attenders may be less convinced of the importance of and need for PNC, which may hinder appropriate PNC use. Non-attenders of prenatal education classes were found to come from more vulnerable groups, with a low level of education or being unemployed.[33] Enhancing the awareness of the importance of appropriate follow-up and the advantages of prenatal classes may stimulate care use.

Cross-border data-sharing enabled the study of PNC utilization in two countries. However, the number of variables used in this study was restricted by the variables equally examined and operationalised in the original studies.[8,14] For example, origin or ethnicity could not be examined in this study due to different operationalisation, although previous studies have identified these variables as important determinants of PNC use.[2,5,6,8,9]

The results of our study demonstrate that educational level and employment status are important factors in obtaining appropriate content and timing of PNC in both regions. One way to promote appropriate PNC would be to introduce measures encouraging women to attend prenatal classes, for example by providing classes free of charge to socially vulnerable women. Furthermore, it is important to systematically create maternal healthcare models in which the continuity of care provider is ensured. Both are modifiable factors that will contribute to more appropriate care use.

Despite the value of this study, more cross-border studies are required to examine other individual determinants, such as origin, social network and health beliefs with regard to pregnancy and care. These studies should also use a larger sample including women residing in both urban and non-urban regions. To achieve this, systematic and routine data collection

that provides information on elements of the CTP tool and the individual characteristics of pregnant women will be required.

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KEY POINTS

- The CTP tool, measuring PNC utilization, was applied in two cohorts from different countries for the first time.
- Irrespective of the region women live in, the content and timing of PNC were associated with educational level, employment status, continuity of caregiver and attending prenatal classes.
- The education system, the health system and PNC providers should address health literacy and the knowledge levels of socially vulnerable women who may require a more personalised approach to improve communication.
- Stimulating attendance of prenatal classes and continuity of care in PNC models are factors that can be modified to contribute to more appropriate care use.
- Systematic, reliable and routine data collection that provides information on elements of the CTP tool and the individual characteristics of pregnant women is required as a basis that will enable joint international research on the determinants of PNC use.

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